

(nitrate) added to the soil, or, as occurs in Leguminosæ, in the form of atmospheric nitrogen, fixed for their assimilation by the symbiotic bacteria at their roots.

Chemotropism, or the effect of chemical agents upon the direction of growth, and heliotropism (phototropism), or the effect of light upon the direction of growth, both receive their due share of attention. The effect of water upon growth is treated separately from that of other chemical agents, this amount of attention being accorded it on account of its immense importance—especially in plants—in the process. The effects of contact with solids and that of molar agents in general are duly considered, and the chapter devoted to them includes subjects so diverse as the results upon the growth of bacteria by violently shaking the vessel containing them, the tendency of twining stems and tendrils to grasp the solid objects with which they come in contact, the effect of wounds upon the growth of plants, and even the effect of flowing water in influencing the direction of growth. The effect of gravity upon the growth of sessile organisms (geotropism) and the results obtained by neutralising this effect by the employment of the klinostat is also considered, and illustrated by numerous diagrams. The effect of atmospheric electricity in increasing the rate of growth was supposed to be demonstrated by the experiments of Grandeau, who reared two similar plants—one in the open, and the other with an enclosure of wide-meshed wire netting—with a marked balance in favour of the one which was exposed freely to the influence of any electricity which might be present in the atmosphere; but others have obtained negative or discordant results.

The effect of heat in influencing the growth of organisms is familiar to every biologist, and Dr. Davenport illustrates it by numerous tables and charts taken from observations upon both plants and animals. It is indeed impossible here so much as to enumerate all the different aspects from which the subject of growth has been studied, and to which reference may be found; and although the book does not profess to be anything more than a compilation, and, in fact, contains no matter which is entirely original, it is that sort of compilation which will be of most use to the student of biology, as indicating to him where he may at once come across the work which has been done in each department of the subject of which it treats. That the information yielded should include everything upon so vast a subject is too much to expect in a book of less than five hundred by no means closely printed pages, and, in fact, one occasionally misses a reference to work of no little interest and importance, such as that of Ringer upon the influence of mineral salts upon the growth of tadpoles, and of Romanes upon the comparative effects of flash light and steady light in producing phototropism in seedling plants. Neither is the subject of the influence of drugs considered at anything like the length which its importance seems to deserve. Nevertheless, for the reasons indicated, and because the book is a painstaking and, on the whole, a successful attempt to furnish a connected account of an important branch of experimental morphology, it will be welcomed by the many workers who are devoting themselves to the pursuit of this interesting class of investigation.

#### A BOOK ON MOUNTAINS.

*Die hochgebirge der Erde.* Von Robert von Lendenfeld. Mit titelbild in Farbendruck 148 Abbildungen und 15 Karten. Pp. xiv + 532. (Freiburg im Breisgau: Herdersche Verlagshandlung, 1899.)

THIS is a most conscientious piece of bookmaking. The author appears to have read and made a summary of all the more important descriptions of the mountain masses of the globe. Beginning with a sketch of the physiography of mountains, their development and sculpturing, he passes on to describe them chain by chain. As he has himself travelled much, he can often speak from personal experience, while the numerous and generally excellent illustrations enable the reader to realise the different types of scenery. Reproductions of photographs are used in most cases, but occasionally, of course, copies of engravings, variable in quality, were alone available. Some, both of the one and the other, have done duty before, and a few perhaps may be more attractive to the general than to the scientific public. Pictures, for instance, of climbers in a mist seem more appropriate to a book of travels, and some of those representing mountain plants or animals are hardly such as to enhance the value of the book. Attractive also as are all Mr. E. T. Compton's sketches, we cannot but feel that in a treatise of this kind reproductions of photographs would have been better, for accurate delineation is sometimes sacrificed to artistic sensibility. This is especially true of the drawing of the Grivola on p. 128, in which we have not found it easy to make out the topography. These, however, are matters of opinion. The book contains a vast mass of information, brought down to the latest possible date, and collected with a thoroughness and accuracy truly German.

The book also exhibits one or two defects, which perhaps, like its merits, are related to its birth-place. In the treatment of the subject we are conscious of some want of lucid arrangement and of a comprehensive grasp. In regard to the former, a brief outline of the contents may perhaps best indicate our meaning. It begins with a short sketch of mountain building and sculpturing, followed by a glance at the characteristic flora and fauna: a subject so wide that any details can only be fragmentary, and we should have preferred to pass it by in a few paragraphs which stated the general principles by which the life distribution has been determined. The author then commences, at the seventieth page, his special descriptions with the mountains west of the Mediterranean, from the Atlas to the Pyrenees. Thence he passes on to the Alps, which are treated, perhaps not unjustifiably, at rather disproportionate length, and then in another section we jump from Sardinia and Corsica to the Apennines, run along the Carpathians to the Balkans, make a leap to the Caucasus, and finally land with the ark on Ararat. Next comes the radiating group of giant chains in Central Asia, of which some of the less known are very well described. In the next section, after a very brief glance at the northern mountains of Eurasia in general, we are transported to Spitsbergen and Iceland, and then restored to the mainland in Scandinavia and the Urals. After that we wander to Central and Southern Africa,

taking flight at last for Arabia and the peninsula of Hindustan. Then, in a long section, we make the circuit of the Pacific together with a digression to Hawaii, and after jumping from Greenland to the Appalachians, and thence to Guiana, finally come to rest on the highlands of Brazil. We find traces, no doubt, of a geographical order in the above, but think that to have kept to continents, while carefully pointing out the relation to ocean basins, would on the whole have produced clearer ideas.

We also feel the want of a concluding chapter, giving a summary of the results which follow from a study of the details contained in the foregoing sections; the principles, if we may so call them, of mountain building and sculpture, and the connection between their forms and materials. The latter was sketched briefly, but accurately so far as it went, by Ruskin years ago in the fourth volume of "Modern Painters," and might now have been elaborated in more detail by Dr. von Lendenfeld from the mass of materials which he has collected. We may illustrate the want of inductive treatment by the case of Monte Rosa. The map, especially if slightly extended eastward, would have given the author an opportunity to discuss an interesting problem leading up to general principles. What causes the extraordinary gap between Monte Rosa and the Strahlhorn? The range of the Mischelhorn seems to be cut off at the southern face of the latter, while another range, running from the west, terminates even more abruptly in the eastern and northern faces of Monte Rosa. In the intervening gap, some four miles wide, nothing on the edge of the great snow-field rises higher than the hump of the Cima de Jazzi itself, obviously terminating a ridge which extends eastward from the Riffelhorn. What is the explanation of this ridge—also cut off abruptly like the others, and of the gap itself? The map suggests to us a solution of the mystery. Beneath a precipitous descent, seldom less than 6000 feet vertical, lies the head of the Macugnaga valley. Here, as in many other cases in the Alps—it is probably equally true of the Théodule gap west of the Breithorn—the denuding forces have acted with greater potency on the Italian side of the watershed, and they have actually quarried away the mountain centre from which these great ridges once radiated and replaced it by the great amphitheatre into which the Macugnaga glacier now descends.

But while venturing on these criticisms we are thankful for what the book gives us, especially for a glossary to help the unlearned and for an excellent index. We lay it down with something like envy. It is one of a series illustrative of the Earth; it is well and almost profusely illustrated, excellently printed, and its price is 14 marks. We presume then that works of this nature find in Germany a sale sufficiently large to make them remunerative to publishers. But would any English firm be adventurous enough to undertake such a series, or even to publish the volume before us? We fear not. Our German cousins value education more than we do, and apparently desire mental food more solid than half-penny newspapers, penny dreadfuls, shilling shockers, or even novels with a purpose.

T. G. BONNEY.

## OUR BOOK SHELF.

*Beginnselen der Scheikunde.* By Dr. M. C. Schuyten. Pp. 109. (Antwerp: Van Ishoven, 1899.)

THIS is an elementary text-book on qualitative analysis, which aims also at imparting some of the fundamental principles of chemistry. A short introduction explaining the difference between physical and chemical change is followed by a list of the more important elements (iron is omitted) with their symbols. From this we pass on to a brief account of some fourteen elements, which are to furnish material for experimental investigation. The author then selects the unfortunate case of copper and sulphur to illustrate the difference between a mixture and a compound. It is needless to say that a more illogical and false illustration could scarcely be conceived. 6.3 grams of copper powder and 3.2 grams of sulphur are mixed together. The student must puzzle out for himself why these precise quantities are taken. Having satisfied himself by the help of a pocket lens that both substances are still present when they are shaken up, the mixture is heated. The blue-black mass which results is now, we are told, a chemical compound consisting of 63.12 parts of copper and 31.83 parts of sulphur, when the author must be fully aware that it is a non-homogeneous mixture of cuprous and cupric sulphide and free sulphur. One is tempted to suggest another example of the same order. Take 1 lb. of sugar and  $\frac{1}{4}$  lb. of butter, and mix them together. The butter and sugar may still be observed with a lens. Proceed to heat them until the required consistency is obtained. The substance is no longer sugar and butter. Consequently, the resulting toffee is not a mixture, but a compound made up of the original ingredients in the proportions taken.

Passing over this unsatisfactory start, the system laid down by the author has much to recommend it. Before the student begins systematic analysis, he is set to perform experiments on the preparation of simple compounds, as well as to study such general reactions as oxidation reduction, the action of acids on metals, &c. The text is interspersed with notes of interrogation, and, in addition, a few questions are appended to each lesson.

Where the book fails is in its attempt to condense a large amount of information into a small compass, and in the lack of sufficient experimental details and adequate illustrations of apparatus.

A beginner, who had no further help than this book affords, would meet with difficulties at every step. No doubt the author's object is to place something in the student's hands which will supplement his own laboratory teaching, and from this point of view its publication may be justified.

*Student's Edition of a Standard Dictionary of the English Language.* Edited by James C. Fernald. Pp. viii + 915. (New York: Funk and Wagnalls Company, 1898.)

*The Standard Intermediate School Dictionary of the English Language.* Edited by James C. Fernald. Pp. viii + 533. (New York: Funk and Wagnalls Company, 1899.)

BOTH these dictionaries are based upon Funk and Wagnalls' Standard Dictionary. The student's edition gives the orthography, pronunciation, meaning and etymology of upwards of 60,000 words and phrases. It is furnished with appendices of proper names, foreign phrases, faulty diction, disputed pronunciations and abbreviations, as well as with a number of useful tables, including those of the chemical elements, metric weights and measures and many others. The student's dictionary also contains some 1225 pictorial illustrations. The school edition provides brief and accurate etymologies, and is furnished with as many as 800 pictures. Both volumes are beautifully printed and serviceably bound.